

REMARKS

Reconsideration is respectfully requested.

By this Amendment, Claim 1 has been amended to correct the spelling of the the word “insulating”, and so to overcome the objection. Claims 1 and 11 have been further amended to more succinctly and precisely recite the subject matter of the Applicants’ invention. Support for this amendment is found at least in Claim 13 as originally filed. No new matter is added.

Claims 1, 11 and 13 were rejected under 35 USC §103(a) as being unpatentable over Lan et al. in view of Yamaguchi et al. and further in view of Usagawa et al.

The primary reference, Lan et al. discloses a micro-filled via formed of a material including a binding material and a number of particles. The Office Action interprets that the micro-filled via (MFV) 541A shown in FIG. 5A corresponds to the metal column recited in claim 1 of the present application. The MFV disclosed in the Lan et al. reference is formed by screen printing and is different from the metal column, which is generally formed by metal-plating.

The Yamaguchi et al. reference discloses a semiconductor device having a bump 28. The Office Action stated that Yamaguchi et al. disclose a metal column 28, but what is indicated by the reference sign 28 is a bump formed on a semiconductor device and is not a metal column formed in a multilayer interconnection substrate.

As mentioned above, none of the references discloses a metal column formed in a multilayer interconnection substrate. It is respectfully suggested that the references may have been misinterpreted without fully considering the disclosure. At least for the above

reason, we believe that claims 1, 11 and 13 are not derivable from a combination of the references.

Additionally, the Office Action stated that the coating layer 30 composed of epoxy resin shown in FIG. 5 of Yamaguchi et al. corresponds to the resin film according to the present invention. Thus, the rejection applied the coating layer 30 of Yamaguchi et al. to FIG. 5B of the Lan et al. reference. If the coating layer 30 of the Yamaguchi et al. reference is applied to a side surface of the MFV 541A, which the Office Action interpreted as a metal column, the result would be that the metal column is covered by a coating layer 30 which is formed of a material different from the material of the insulating layer 441 shown in FIG. 5B of the Lan et al. reference.

On the other hand, in the present invention, the resin layer and the insulating layer are formed of the same material, since the resin film is formed by removing a part of the insulating layer bearing the metal column. Claims 1 and 11 have been amended to more clearly recite that “the insulating layer formed on said uppermost interconnection layer [is] of the same material as the resin film.”

In the structure of the present invention, when a solder bump of a semi-conductor element is subjected to a solder-reflow process, the melted solder bump is prevented from flowing down along the circumferential side surface of the resin film 206. As amended, the resin film 206 is formed of a material different from the material of the metal column 208, and thus, the properties of the top surface 206a of the resin film 206 are different from the properties of the top surface 208a of the metal column 208. Accordingly, the melted solder on the top surface 208a of the metal column 208 does not spread to the top surface 206a of the resin film 206, which results in prevention of the melted solder flowing along the side

surface of the resin film. Thus, the melted solder is prevented from being filled in the gap between the resin film 206 and the insulating layer 210 which may prevent a stress relaxation effect of the metal column and the gap around the metal column.

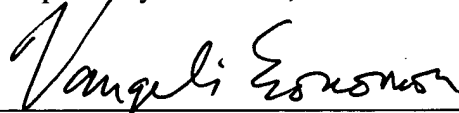
Additionally, since the solder does not flow and stay on the top surface of the metal column, it is not necessary to provide an excessive amount of solder, thereby avoiding the condition where the bump becomes excessively large. Thus, a semi-conductor element having high-density bumps can be connected.

With respect to the disapproval of the earlier submitted drawing corrections, Applicants submitted corrected drawings with the Amendment filed on 7 February 2003. Nevertheless, Applicants again submit the drawing corrections showing the extension of the lead line for element 107 to indicate the correct illustrated feature. The drawing correction is sent again so that the red line markings are clearly shown, in response to the Office Action maintaining the drawing correction requirement.

For the above reasons, it is considered that the claims, as amended, find support in the parent application specification as filed, and that the combination of elements recited in the pending claims, as amended, distinguish over the references of record. Accordingly, an indication of allowable subject matter is earnestly solicited.

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Respectfully submitted,



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